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## **Solar UV irradiation-induced production of N<sub>2</sub>O from plant surfaces - low emissions rates but all over the world.**

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Nitrous oxide (N<sub>2</sub>O) is an important long-lived greenhouse gas and precursor of stratospheric ozone depleting mono-nitrogen oxides. The atmospheric concentration of N<sub>2</sub>O is persistently increasing; however, large uncertainties are associated with the distinct source strengths. Here we investigate for the first time N<sub>2</sub>O emission from terrestrial vegetation in response to natural solar ultra violet radiation. We conducted field site measurements to investigate N<sub>2</sub>O atmosphere exchange from grass vegetation exposed to solar irradiance with and without UV-screening. Further laboratory tests were conducted with a range of species to study the controls and possible loci of UV-induced N<sub>2</sub>O emission from plants. Plants released N<sub>2</sub>O in response to natural sunlight at rates of c. 20-50 nmol m<sup>-2</sup> h<sup>-1</sup>, mostly due to the UV component. The emission rate is temperature dependent with a rather high activation energy indicative for an abiotic process. The prevailing zone for the N<sub>2</sub>O formation appears to be at the very surface of leaves. However, only c. 26% of the UV-induced N<sub>2</sub>O appears to originate from plant-N. Further, the process is dependent on atmospheric oxygen concentration. Our work demonstrates that ecosystem emission of the important greenhouse gas, N<sub>2</sub>O, may be up to c. 30% higher than hitherto assumed.

### Literature:

Mikkelsen TN, Bruhn D & Ambus P. (2016). Solar UV Irradiation-Induced Production of Greenhouse Gases from Plant Surfaces: From Leaf to Earth. *Progress in Botany*, DOI 10.1007/124\_2016\_10.

Bruhn D, Albert KR, Mikkelsen TN & Ambus P. (2014). UV-induced N<sub>2</sub>O emission from plants. *Atmospheric Environment* 99, 206-214.